

<b>Department</b>	06 Applied Sciences and Mechatronics
<b>Course title</b>	<b>Power Electronics</b>
<b>Course number</b>	PBR675
<b>Hours per week (SWS)</b>	4
<b>Number of ECTS credits</b>	5
<b>Course objective</b>	<p>With reference to the higher-level objectives of the Bachelor's program in Engineering Physics, this module contributes primarily to competence area 3: Application of physical insights to new technologies.</p> <p>The module imparts deeper engineering knowledge of power electronics devices. Participants in the course learn to design and to analyse electronic circuits and systems. They learn to use industry-standard software like Spice for circuit simulations and Matlab for analysing and visualising measurement data.</p> <p>After successful completion of the module, participants can assess engineering problems in the field of power electronics and develop own solutions.</p>
<b>Prerequisites</b>	Fundamentals of electrical engineering, electronic devices and electronic circuits. Practical skills in working with multimeters and oscilloscopes.
<b>Recommended reading</b>	<p>Ned Mohan, Power Electronics, Wiley, 2012.</p> <p>Raymond Ramshaw, Power Electronics Semiconductor Switches, Chapman &amp; Hall, 1993.</p>
<b>Teaching methods</b>	Teaching in small classes (lecture), excercises, lab
<b>Assessment methods</b>	Exam, simulation/lab evaluation
<b>Language of instruction</b>	English
<b>Name of lecturer</b>	Prof. Dr.-Ing. Torsten Mahnke
<b>Email</b>	<a href="mailto:torsten.mahnke@hm.edu">torsten.mahnke@hm.edu</a>
<b>Link</b>	<p><a href="https://sci-intern.hm.edu/fk/vita.php?id=785">https://sci-intern.hm.edu/fk/vita.php?id=785</a></p> <p><a href="https://sci-intern.hm.edu/fk/modulbeschreibungen.php?id=1874&amp;lang=en">https://sci-intern.hm.edu/fk/modulbeschreibungen.php?id=1874&amp;lang=en</a></p>
<b>Course content</b>	<p>Introduction to power electronics</p> <p>Multimeters and oscilloscopes for converter characterization</p> <p>Current sensing using shunts and current transformers</p> <p>Semiconductor power switches</p> <p>Passive components</p> <p>DC-DC converters I (buck)</p> <p>Converter losses and efficiency</p> <p>DC-DC converters II (boost)</p> <p>Thermal design</p> <p>DC motor drives</p> <p>Three-phase power systems</p> <p>AC-DC conversion (rectification) and SMPS</p> <p>Network disturbances/EMI</p> <p>BLDC motor drives</p> <p>Three-phase motor drives</p> <p>DC-AC conversion (inversion, "Frequenzumrichter")</p> <p>More applications (LED lighting, UPS, ...)</p>
<b>Remarks</b>	